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NOTES ON CERTAIN SPECIES OF ANTENNARIA.

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CONSIDERABLE attention during recent years has been given to the study of the eastern species of Antennaria. Many species of the middle Atlantic states and of the prairie states of the Mississippi valley have been characterized by Professor E. L. Greene, those of the District of Columbia and vicinity in particular having been the subject of much field study by the same author. Mr. M. L. Fernald has published a synopsis of the New England species, supplemented by subsequent papers containing notes and a key. Through the field and herbarium studies of Mr. Fernald, and the notes and observations of various collectors, the species of the New England states are perhaps better known than those of any other region of equal area in North America. The most recent synopsis of the eastern species is that which has appeared in Dr. Britton's *Manual*. Thanks to the efforts of many collectors, we are constantly becoming better acquainted with these plants, but much remains to be learned even concerning the eastern species.

A revival of interest in any long neglected group of plants, is generally attended with much describing of species, resulting in many new names, some of which must sooner or later be relegated to synonomy. It is not at all surprising, therefore, to find that several of the species now generally accepted have received two or more names during the recent study of this genus. What in many instances appeared to be very distinct, on further examination in the light of more material often proves to be less deserving of the specific or perhaps sub-specific recognition at first accorded it. A fair representation of a species by specimens from different localities in its range is necessary for an adequate knowledge of the plant. The variations, relationship, and distribution of each species needs to be worked out, and as regards our eastern Antennarias this remains to be done for most of them.

The plantain-leaved species are very polymorphous and almost indistinguishable. It would not be at all difficult in any large collection to spread out a series of specimens exhibiting a gradation of *A. neglecta* through *A. petaloidea* and *A. ambigens* into *A. Parlinii.* In spite of the frequent intergradations we do recognize as tolerably well marked some categories of forms to which it seems proper as well as desirable to assign binomial names. Though authors will to some extent differ in judgment as to the validity of certain species, it is gratifying to note that different investigators in this group in several instances have reached the same conclusions.

In the segregates of *A. plantaginifolia*, *A. dioica*, and *A. alpina* of earlier American authors, the general habit and stature of the plant, the outline and size of the leaves, the character and permanency of the pubescence, and the height of the involucres are of most value for specific diagnoses. The outline of the bracts of the pistillate involucres, especially as regards the bluntness or acuteness of their tips, are of minor importance in distinguishing species. In most of the eastern as well as of the western Antennarias I have found that the tips of the involucral bracts (pistillate) vary from obtuse to acute or acuminate. The outline of the bracts has quite generally been given in recent descriptions, and the bluntness or acuteness of their tips has in many instances been taken as one of the distinctive characters of certain species and sub-species. The amount of thickening or dilation of the pappus bristles of the staminate flowers is also found to be subject to considerable variation in the same species.

It is a well established fact that parthenogenesis occurs in the real *Antennaria alpina.* While there is at present no evidence to show that any North American species are propagated parthenogenetically, it perhaps would not be at all surprising to find that it does take place in some of them. We at least know that good seeds may be produced. Mr. Theo Holm, of Brookland, D. C., assures me that he has observed in that vicinity an abundance of seedlings, but which species they represented could not be determined. They were found, however, near patches in which *A. Parlinii* (*A. arnoglossa*), *A. plantaginifolia*, and *A. neglecta* were growing. In Antennaria, as well as in the related genera Gnaphalium and Anaphalis, the plants may be polygamo-dioecious. *A. plantaginifolia* (*A. decipiens* Greene), however, is the only species in which I have observed perfect flowers.

In consequence of my distribution of North American Antennarias I have received many collections from various parts of the United States and Canada, thus giving me an opportunity to study among others the species of the eastern United States. The material in the U. S. National Herbarium has been at my disposal, and through the courtesy of Professor E. L. Greene it has been my privilege to examine the types of his species. I am under great obligations to Mr. M. L. Fernald for communications of specimens and other favors. The facts which have been brought out in the course of my study of the eastern species and the opinions I have been constrained to entertain are set forth in the following notes, which I hope will not be without interest to the students of this genus.

ANTENNARIA LABRADORICA Nutt. Trans. Am. Phil. Soc. 7:406. 1841.—A very good species, originally described from Labrador specimens. It is in part the *A. alpina* of Britton's *Manual.* There can be no doubt as to its distinctness from *A. alpina.* Nuttall himself says of it: "at first glance resembling *A. alpina*, but more nearly allied to *A. plantaginea.*" Its affinities are with *A. canadensis* and *A. neodioica*, the brownish involucres suggesting *A. alpina.* I have examined an undoubted specimen of this species deposited in the herbarium of the Geological Survey of Canada (sheet no. 14363). Since Professor Greene, who has seen the same material, gives a brief characterization of the species,[1] I will here only record some measurements taken of some parts of the plants on this sheet. Basal leaves 1–2^{cm} long; lowest pedicel of the inflorescence 3.5^{cm} long; involucres 6–7^{mm} high.

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[1] Pittonia 3:285. 1897.

ANTENNARIA NEODIOICA Greene, Pittonia **3**: 184. 1897.—*A. neodioica attenuata* Fernald, Proc. Bost. Soc. Nat. Hist. **28**: 245. 1898. *A. rupicola* Fernald, Rhodora **1**: 74. 1899. *A. alsinoides* Greene, Pittonia **4**: 83. 1899.—This species was described from specimens secured near Stroudsburg and Bushkill in the extreme eastern part of Pennsylvania. Typically it has involucres whose outer bracts are obtuse and the inner acute. True *A. neodioica* is much less common than the forms with narrow, attenuate involucral bracts. The staminate plants are certainly very rare, being unknown both to Mr. Fernald and myself. Professor Greene, however, seems to have had some staminate plants when drawing up the original description.

Taken in its entirety, this species is readily separated from any Antennaria to be found in eastern North America. It is quite variable, and some of its forms have received sub-specific or even specific names. Dr. Britton[2] considers all the forms of this particular category as representing only one species. In this I think he is entirely right. I had myself, independently, reached the conclusion that *A. neodioica attenuata* and *A. alsinoides* are the same, and am now of the opinion that the form to which these two names were applied cannot consistently be accorded even sub-specific rank.

An examination of a series of specimens from localities ranging from Ontario and the New England states to Maryland shows that the species varies chiefly as follows: basal leaves from relatively narrow with oblanceolate expanded portion and then not clearly differentiated into blade and petiole, to rather broad, the expanded portion obovate with a more distinct petiolar base; inflorescence from somewhat paniculate to subcorymbose, either closely congested or tolerably open; bracts from much acuminate to more or less obtuse, scarious or petaloid, rarely lemon-tinged. Were any two or more of these variations always associated, there would here be some justification in recognizing sub-species. Professor Greene states that his *A. alsinoides* as compared with the typical *A. neodioica* has its heads

[2] Science, n. s. **13**: 587. 1901.

on shorter pedicels, and that its leaves are more "clearly differentiated into blade and petiole," the expanded portion of the leaves being obovate. The congested character of an inflorescence is found to be by no means always accompanied by relatively broad leaves, for some Ontario specimens examined by me have an inflorescence answering to Professor Green's description, but the expanded portion of the leaf is oblanceolate. The stolons are said to be equally leafy throughout, but that is quite often the case in typical *A. neodioica*. Mr. Fernald assigns to his *A. neodioica attenuata* no other distinctive characteristic than that exhibited by its involucral bracts. It does not seem well to make sub-species on single characters, especially of a species with such freely intergrading forms. The character of attenuate bracts is accompanied either by relatively narrow or rather broad leaves, and either by a close or tolerably open inflorescence. Mr. Fernald has characterized another sub-species, viz., *A. neodioica grandis*, of which I have seen no specimens. *A. rupicola* is merely a dwarfish form of *A. neodioica*, with lemon-tinged involucral bracts and basal leaves slightly narrower than is ordinarily the case in this species.

ANTENNARIA PETALOIDEA Fernald, Rhodora **1**: 73. 1899.—*A. neodioica petaloidea* Fernald, Proc. Bost. Soc. Nat. Hist. **28**: 245. Je 1898. *A. neglecta subcorymbosa* Fernald, *l. c.*, 246. *A. Farwellii* Greene, Pittonia **3**: 347. S 1898. *A. petaloidea scariosa* Fernald, Rhodora, *l. c.* *A. petaloidea modesta* Elias Nelson, Proc. U. S. Nat. Mus. **23**: 710. 1901.—In this species we have a connecting link between the unusually well marked *A. neglecta* and *A. ambigens*. Though grading into *A. neglecta* it may be distinguished readily from that by its corymbosely cymose inflorescence and generally broader leaves. The heads are as a rule more numerous than in *A. neglecta*. In that species, as noted by Mr. Fernald, the staminate plant is quite as common as the pistillate, while in this it is very rare. As in *A. neglecta*, the thin tomentum of the upper surface of the leaves is either persistent or deciduous. In outline the leaves vary from spatulate or oblanceolate to obovate-cuneate, and in width from 7 to 17^{mm}.

The stolons, though generally like those of *A. neglecta*, are often more leafy, and then resemble those of *A. ambigens*. *A. petaloidea*, when constituted as a species by Mr. Fernald, was known to him only from northern New England. I have it, however, from two localities in Ontario, and Mr. C. K. Dodge has collected it repeatedly in St. Clair co., Mich. Undoubted specimens of this species have also been secured by Professor De Alton Saunders in the Black hills of South Dakota. This collection contains both pistillate and staminate plants. The latter are 8–13^{cm} high, with two to four heads to the cluster, the bracts with oval to oblong, obtuse tips, and the pappus bristles with moderately and uniformly thickened upper portions, or occasionally very slightly dilated at summit.

I have examined the type of *A. Farwellii*, and find that it is nothing else than *A. petaloidea* Fernald. What Mr. Fernald[3] and Dr. Britton[4] have supposed to be *A. Farwellii* is not that species, but a much larger-leaved plant closely allied to *A. ambigens*. The basal leaves in the type are lightly tomentose above, indistinctly 3-nerved beneath, only 3–4^{cm} long, and not exceeding 13^{mm} in width.

ANTENNARIA PARLINII Fernald, Gard. & For. **10**: 284. 1897.—*A. arnoglossa* Greene, Pittonia **3**: 318. 1898. *A. Parlinii arnoglossa* (Greene) Fernald, Proc. Bost. Soc. Nat. Hist. **28**: 243. 1898.—The typical form of this species is a New England plant with leaves green and glabrous above from the first, with stems beset with purplish ciliate hairs and with large involucres of narrow acuminate inner bracts. There are some deviations from this type even in the New England states. The ciliate hairs are at times absent, and the basal leaves often slightly arachnoid above. Some Illinois specimens examined by me are also somewhat arachnoid on the upper surfaces of the leaves, and very few ciliate hairs are present. In plants from Washington, D. C., and vicinity the ciliate hairs are present in some, absent in others, the leaves either wholly glabrous above or nearly so and the involucral bracts either broad and obtuse or rather narrow. It will be seen from the above account of its forms that as to involucral bracts, glandulosity, and presence of ciliate hairs it presents the same variations as *A. ambigens.* As to stature, size of leaves and involucres, and general habit it resembles that species very closely and indeed it grades into it. Although there is no sharp line of demarcation between these two species, yet it seems well to let the two names *A. ambigens* and *A. Parlinii* stand for the two categories of forms, those with permanently tomentose upper surfaces of the leaves falling into the former, and those with leaves smooth above or nearly so into the latter. From *A. plantaginifolia* the species is quite readily separated, and though the chief distinction is that of size the difference is constant, and I think no one who once has formed a mental picture of the two species would have any difficulty in distinguishing them.

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[3] Rhodora **1**: 153. 1899.

[4] Manual, 976.

ANTENNARIA PROPINQUA Greene, Pittonia **4**: 83. 1899.— Originally described from staminate specimens only, collected at Harper's ferry, West Virginia, but now also known to me through plants secured by G. B. Ashcraft at Berea, Ohio. This collection contains both staminate and pistillate specimens. Even the pistillate plants are rather low, only 16 ^{cm} high; the heads few and closely congested, and the involucres 8 ^{mm} high. The herbaceous portion of the involucral bracts is livid green and glandular. The inner bracts of the pistillate involucres are narrow and acuminate, while the outer are somewhat broader, their tips oblong, lanceolate, or oblong-linear, acute or obtusish. The pappus bristles in the staminate flowers are only slightly narrower at the tips than those observed in some specimens of *A. Parlinii.* When more specimens of *A. propinqua* are at hand, we shall be able to judge better of its claims to specific rank.

ANTENNARIA BRAINERDII Fernald, Rhodora **1**: 153. 1899.— It is doubtful whether this can be maintained as a distinct species. As exemplified by Mr. W. W. Eggleston's specimens of 1899 and President Brainerd's of 1900, it is certainly very closely allied to *A. Parlinii* on the one hand and to *A. ambigens* on the other. In both of those species, as we have already noted, the presence or absence of ciliate hairs is a matter of much variation, and in both the basal leaves are at times relatively as broad as those of *A. Brainerdii.*

ANTENNARIA AMBIGENS (Greene) Fernald, Rhodora **1**: 150. 1899.—*A. arnoglossa ambigens* Greene, Pittonia **3**: 320. 1898. *A. Parlinii ambigens* (Greene) Fernald, Proc. Bost. Soc. Nat. Hist. **28**: 244. 1898. *A. fallax* Greene, Pittonia **3**: 321. 1898.—This is the commonest of the eastern species of Antennaria which have large heads and ample, plantain-like basal leaves. It ranges from Minnesota, Ontario, and Maine to Kansas, Mississippi, and Virginia. As many other American species, it is quite variable. It is nearly always more or less glandular, quite as often so in the acuminate-bracted forms as in the typical one. Ciliate hairs may be found about the inflorescence, on the stems, and on the margins and surfaces of the leaves. These hairs are usually purple, but when occurring on the surfaces of the leaves are colorless. The upper surfaces of the basal leaves are permanently arachnoid or tomentose above, and the tomentum of their lower surfaces is generally persistent. Often, however, it forms a crustaceous coating which occasionally is deciduous in flakes. The involucral bracts of the pistillate plants may be either narrow and attenuate or broader and petaloid. Often they are purplish as in *A. Parlinii.* There is some variation in the stature of the plant, the leafiness of the stems, and the character of the inflorescence, but these variations fail to furnish any diagnostic characters. The staminate plant is somewhat lower and its involucral bracts have ovate or oblong, obtuse, petaloid tips. The pappus bristles are either clavellate or more or less dilated and then bluntly toothed or somewhat lacerate, the filamentous portion serrulate upwards.

The type specimens of *A. arnoglossa ambigens* were collected near Brookland, D. C., and Professor Greene informs me that he has found but one patch of it and that situated in a field of his *A. fallax.* These specimens are slightly glandular and the tips of the outer involucral bracts are oblong and obtuse, those of the inner acuminate. On one of the sheets the plants have some purple hairs about the inflorescence.

The type material of *A. fallax* was collected in the same locality as that of *A. arnoglossa ambigens*. There are six sheets labeled *A. fallax* in the herbarium of Professor Greene. On three of the sheets the plants are without ciliate hairs, while on the other specimens these are present. Only two of the four specimens of pistillate plants have attenuate inner bracts, and in only one of these are they setaceously pointed. One of these specimens with inner attenuate bracts has some purple hairs about the inflorescence.

There is thus a very evident gradation of *A. arnoglossa ambigens* into *A. fallax*, even in the original material. A careful study of a larger series of specimens shows that the two cannot be separated, being simply forms of one species. I have recently learned through a communication from Mr. Fernald that further observation in the field has led him to the same conclusion, and Dr. Britton [5] also is inclined toward this belief.

ANTENNARIA PLANTAGINIFOLIA (L.) Rich. in Hook. Fl. Bor. Am. **1** : 330. 1837.—*Gnaphalium plantaginifolium* L. Sp. Pl. 850. 1753. *G. plantaginea* L. Syst. Veg. Ed. 12. **2** : 545. 1767. *A. plantaginea* (L.) R. Br., Trans. Linn. Soc. **12**: 123. 1818. *A. decipiens* Greene, Pittonia **3** : 278. 1898.—*A. nemoralis* Greene, Pittonia **4**: 41. 1899. This is the low, plantain-leaved species, having small heads and foliage persistently arachnoid on the upper surface. It is closely allied to *A. ambigens* and grades into it. It is a comparatively glandless plant, the flowering stems and the leaves being rarely at all glandular, and in no specimens have I detected any ciliate hairs. The basal leaves vary from round obovate to ovate or narrowly elliptic, and the petiole is often much elongated, especially in the forms with narrower leaves. The bracts of the pistillate involucres are generally petaloid and obtuse or obtusish, but not infrequently somewhat scarious and acute or acuminate in the inner. In the staminate involucres the whitish tips are oval, ovate, or oblong, and vary in different plants as to size and number. The pappus bristles in the staminate flowers though generally very narrow and serrulate are at times somewhat dilated toward their apices.

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[5] Manual, p. 796.

I am unable to separate *A. nemoralis* Greene from this species. It is of the same size and has the same foliage characteristics as *A. plantaginifolia*. Mr. Albert Ruth has sent me some material secured by him in the same grove in which was collected the type of *A. nemoralis*. The leaves in these plants vary from ovate and elliptic to round ovate, and the arachnoid pubescence is persistent on the upper surface. There were two pistillate plants in Mr. Ruth's collection, and these have the narrow involucral bracts characteristic of *A. plantaginifolia*.

Hermaphrodite flowers apparently are not infrequent in this species. Plants with some flowers containing well developed stamens and pistils and plump akenes have been detected in three different collections. These specimens are respectively from Biltmore, North Carolina, Takoma park, D. C. (*E. N. Wilcox*, 1901), and Knoxville, Tennessee (*Albert Ruth*, 1901). They are in each case accompanied by sterile plants. They are readily distinguished from both the strictly pistillate and the staminate individuals by their involucral bracts, which are much broader than in the former, but not as broad as in the latter; or, to be more definite, their obtuse, white tips are from oblong-linear to oblong. The pappus-bristles are coarser than those of the pistillate flowers, slightly thicker toward their apices and somewhat serrulate. In their general appearance the heads of the individuals having some perfect flowers resemble those which are strictly pistillate, and indeed I at first mistook them for pistillate plants.

ANTENNARIA OCCIDENTALIS Greene, Pittonia 3: 322. 1898.—The plant which I at present tentatively refer to *A. occidentalis* is the *A. Farwellii* of Mr. Fernald and Dr. Britton. It appears to be quite distinct, and is known to me through specimens from New York, Vermont, Ontario, Michigan, and Wisconsin. As to the involucres and the outline of the basal leaves, it agrees so well with Professor Greene's description of *A. occidentalis* that I refrain from assigning it a new name until satisfied that it is not that species.

ANTENNARIA ARGENTEA **aberrans,** subsp. nov.—Like the species, but inflorescence racemosely paniculate.—Type in the U. S. National Herbarium, collected by M. E. Jones on Mt. Shasta in California, alt. 5,000 ft., June 18, 1897. There are only pistillate plants on the sheet, and these are about 15^{cm} high, and have oblanceolate, acute radical leaves $3–4^{cm}$ long and $6–7^{mm}$ wide.

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